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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/596,400

06/12/2006

Gregory Pipko

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LOWE HAUPTMAN HAM & BERNER, LLP

1700 DIAGONAL ROAD

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ALEXANDRIA, VA 22314

EXAMINER

WU, IVES J

ART UNIT

PAPER NUMBER

1797

MAIL DATE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/596,400	Applicant(s) PIPKO ET AL.	
	Examiner IVES WU	Art Unit 1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(1). **Claims 1-7, 12** are rejected under 35 U.S.C. 102(a) as being anticipated by Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" Presented at POWER-GEN International, **December 9-11, 2003**.

As to a method for removing mercury vapors from waste gas comprising contacting waste gas with a scrubbing agent comprising organic sulfoxides in **independent claim 1**, scrubbing agent being essentially pure organic sulfoxides in **claim 2**, waste gas to be a combustion flue gas in **claim 4**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" discloses: Details are presented of the developmental history and applicability of diverse, worldwide, proprietary and generic chemical process technologies for simultaneous SO₃/NO_x removal in **scrubbers**. Many such techniques are being introduced or developed and/or assessed for commercial use in the U.S. by integration into commonplace FGD (**flue gas** desulfurization) operations. Invariably calling for a degree of gas-phase pre-oxidation of flue-gas NO, e.g. to N₂O₃, NO₂ or N₂O₅, each detailed alternative method also provides some degree of additional, previously unanticipated oxidation and resulting scrubber-collection of gasborne elemental mercury (Abstract, line 1-8). It is aimed at establishing successful commercial use of a to-be-selected, optimal, chemical process means for converting existing U.S. wet limestone scrubbing systems to gain simultaneous SO₂/NO_x operation along with enhanced removal of mercury. Among these are Mitsubishi Heavy Industry's iodine pseudo-catalytic wet process; Lextran Solutions' wet process utilizing a non-aqueous, non-miscible, organic sulfoxide byproduct of petroleum refinery operations as regenerable absorbent (Abstract, line 16-21).

As to scrubbing agent to be an emulsion of water-in-organic sulfoxides in **claim 3**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in

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Scrubbers" discloses: The wet DeSNO_x Process, also developed overseas, (Europe/Asia), uses as pseudo-catalyst, Lextran, which is a high boiling point, regenerable by-product organic waste material derived from petroleum refining operations. It, in a **water emulsion**, directly absorbs specific acid gases, e.g. SO₂ and NO/NO₂, the latter having been transformed catalytically to N₂O₃ (page 5, line 6-10). SO₂ and NO_x are captured in the scrubber by the Lextran liquid, present along with the aqueous medium as a water-emulsion (page 7, line 19-20).

As to waste gas to be a gas mixture released from a chemical process in **claim 5**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" discloses: The Bush Administration's Clear Skies initiative, EPA's December, 2000, regulatory determination regarding power plant emissions of mercury, and the multi-pollutant reduction bills in the Congress are focusing on future coordinated reductions of NO_x, SO₂, and mercury emissions from powerplant. This will be boon to early use of attractive integrated control technologies (Introduction, line 23-27).

As to a stream of air or of ozonated air to be added to the stream of waste gas in **claim 6**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" discloses: ozone and compressed air used in wet catalytic Sorption Process of Lextran Flue Gas Solutions (page 7).

As to organic sulfoxides being oil derived sulfoxides in **claim 7**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" discloses: Lextran Solutions' wet process utilizing a non-aqueous, non-miscible, organic sulfoxide byproduct of petroleum refinery operations as regenerable absorbent (Abstract, line 19-21).

As to scrubbing agent being regenerated after it is loaded, by letting scrubbing agent to separate into two phases, collecting the upper sulfoxides phase and adding to sulfoxide phase a fresh amount of aqueous solution in **claim 12**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" discloses: Thereafter, the regenerated, non-miscible Lextran (organic) is separated from the above acid reaction-products in a gravity settler, the latter yield discharged as a by-product 20-30% aqueous solution to be used in producing fertilizer-blending stock (page 8, line 7-10). It is engineering routine to add fresh amount of aqueous solution of Lextran to the regenerated Lextran in order to keep sufficient Lextran solution for operation.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(2). **Claims 8-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" presented at POWER-GEN International, December 9-11, 2003.

As to oil derived sulfoxides being derived from the diesel fraction of oil in **claim 8**, it is noticed that process limitation for the product in process claim. The patentability of a product does not depend on its method of production. *In re Thorpe*, 777 F.2d 695,698, 277 USPQ 964, 966 (Fed. Cir. 1985).

As to weight ratio of water:organic sulfoxide in the emulsion to be in the range 10:90 to 90:10 in **claim 9**, and range 10:90 to 50:50 in **claim 10**, the ratio 1:1 in the range is obvious.

As to weight ratio of water:organic sulfoxides in the emulsion to be 30:70 in **claim 11**, in absence of showing criticality of the records, the optimized weight ration for water: organic sulfoxides to be 30:70 in a known process render prima facie obvious within one of ordinary skills in the art. *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215,219 (CCPA 1980).

(3). **Claims 13-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" presented at POWER-GEN International, December 9-11, 2003, in view of Broderick (US 6942840B1).

As to step of contacting the waste gas with scrubbing agent to be conducted in a tower embedded with inert particles wherein the waste gas is passed upward through tower and the scrubbing agent is circulated downward in a rate which ensures complete wetting of inert particles in **claim 13**, step of contacting the waste gas with scrubbing agent to be conducted in a tower through which the waste gas is passed in an upward direction and the scrubbing agent is sprayed into the tower from the upper opening of the tower forming a fog of scrubbing agent the tower in **claim 14**, Ellison "Chemical Process Design Alternatives to Gain Simultaneous NO_x Removal in Scrubbers" **does not teach** details of scrubber operation as claimed.

However, Broderick (US 6942840B1) **teaches** method for removal and stabilization of mercury in mercury-containing gas streams (Title). It directs to a process and apparatus for removing and stabilizing mercury from mercury-containing gas stream. A gas stream containing vapor phase elemental and/or speciated mercury is contacted with reagent, such as an oxygen-containing oxidant, in a liquid environment to form a mercury-containing precipitate. The mercury-containing precipitate is kept or placed in solution and reacts with one or more additional reagents to form a solid, stable mercury-containing compound (Abstract). A variety of types and shapes of scrubber may be used, including a fixed bed, fluidized bed, random packed bed, and structured packed bed. In a preferred embodiment, the scrubber is a packed vertical column at least partially filled with inert packing material having sufficient surface area to facilitate the contact between the liquid and gas streams and to promote the desired reactions. Preferably, the gas stream and the liquid reagent are introduced into the scrubber in such a manner as to provide a counter current flow (Col. 5, line 15-21, 35-36). The gas/liquid ratio may be adjusted in several ways, e.g., by changing the pump circulation rate or spraying more or less liquor into the scrubber or by changing the gas feed rate (Col. 6, line 14-17).

The advantages of scrubber contact is to improve process to remove vapor phase mercury and mercury-containing compounds from a gas stream and to stabilize the reaction product into a solid, stable compound that can be disposed of as a non-hazardous waste (Col. 2, line 15-19).

Therefore, it would have been obvious at time of the invention to employ the details of mercury vapor scrubber operations disclosed by Broderick for the scrubber of Ellison in order to attain the advantage cited above.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu

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Date: July 29, 2009

/Frank M. Lawrence/

Primary Examiner, Art Unit 1797